THE OPTICAL MAGIC LANTERN JOURNAL AND PHOTOGRAPHIC ENLARGER.

EDITED BY J. HAY TAYLOR.

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Notices.

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Notes.

A HAPPY and prosperous New Year.

* * *

As previously announced, each volume will in future commence with the New Year.

* * *

IT has been decided by the members of the London and Provincial Photographic Association to hold a ladies' evening next month. Music, the lantern, and other items of interest will be provided.

* * *

THE South Metropolitan Gas Company has undertaken to pay all expenses in connection with a committee appointed by the Board of Trade to consider what is in future to be considered as the standard of light, the candle standard as at present used being considered unreliable.

* * *

"SOMETHING for nothing" is not usual in these times, but Messrs. Field and Co., of 142, Suffolk Street, Birmingham, are prepared to send, free, a lantern slide of a Swiss view, on receipt of name and address. The exposure of the negatives from which the slides are obtained were timed by Watkins' exposure meter.

* * *

FROM a Continental Exchange we learn that it is proposed to make lantern transparencies on long flexible strips of specially-prepared paper. The paper is treated with oil of creosole, then with a solution of colophony, and finally with gelatine. An emulsion is spread upon this base, and transparencies are made. The film is to be wound upon rollers, placed at either side of the lantern stage.

* * *

SOME of our readers may be aware that a cylinder gauge and fittings exploded at the Photographic Club about the time our last issue was published. Mr. F. A. Bridge, who is an expert in lantern matters, was gauging the contents of the cylinder at the time of the explosion. Had Mr. Bridge been leaning over the cylinder at the time (as operators often do), we should not have had an opportunity of hearing the *why and the wherefore* from his lips; no one was injured. The facts of the case, as told by Mr. Bridge, will be found on another page.

* * *

In the course of a letter from Hon. Slingsby Bethel, commenting upon the recent explosion, he suggests that gas-bags should never be placed in the midst of an audience, as they can easily be placed out of harm's way in a side room, or even outside in a yard, and that the lantern should always be behind the audience. Speaking of jets, Mr. Bethel says that the blow-through is sufficiently powerful for the majority of country entertainments. Some twenty-five years ago he had constructed a blow-through jet, which was in no way inferior to the ordinary mixed jet. In it the oxygen nipple terminated one-eighth inch from the hydrogen orifice.

* * *

Another startling invention in the lantern line is promised by a London firm of manufacturers. A hundred slides are placed in a box at the lantern. These are automatically brought into position in the lantern, and then passed into another box, all by the mere pressure of an electric button by the lecturer. This arrangement will enable a lecturer to operate his lantern, no matter how far he may be from it, and ensure the slides being revealed upon the screen exactly at the time required. All this we are promised for *next* season; meantime, a gentleman whose name is well known in the lantern line, has almost completed a model, and we have been promised an invitation to witness its performance as soon as it is finished. We presume, however, that it will be requisite to keep a boy stationed at the lantern to turn the lime and attend to any focussing which may be required, unless these, too, are done by electric current.

* * *

Oxygen, it has long been known, stands alone among the gases in being slightly magnetic. An experiment has, however, been made by Professor Dewar, of Cambridge, which very strikingly illustrates this property. Mr. Dewar has succeeded in reducing this gas to a liquid condition. Under a temperature of 180 deg. Centigrade below zero, he poured the liquid oxygen into a shallow saucer of rock crystal, a mineral which it does not moisten or to which it does not adhere, and consequently maintains in connection with that substance a perfect spheroidal condition. It was naturally expected, considering the magnetic inclinations of the gas, that under magnetic stress there would be a total or partial arrest of the violent agitation caused by the ebullition of the mass of liquid oxygen. Something much more marked, however, happened; for on being brought into relation with a powerful electro-magnet, the entire spheroid was literally lifted through the air, and remained adherent to the poles until dissipated by the heat of the metal. As all physicists know, iron and other metals lose their magnetism when red-hot. But this increase of power in a feebly magnetic gas when concentrated by cold is not paralleled by the behaviour of any other magnetic metal in solution.

:o:

Instructions for Inexperienced Lanternists.

No. I.

One of the first things for a tyro to learn in connection with lanterns is that outward show in a lantern is no criterion as to its being a serviceable instrument from a lasting point of view, or its utility as an apparatus for optical projection. It is quite possible for an article of very inferior kind to be polished up to resemble (to an inexperienced eye), a high-class instrument, and many such are constantly being sold. It will be at once evident that these remarks in no way apply to recognised dealers and makers of lanterns, who having a reputation to sustain would not dream of selling anything which was not as represented.

It is well-known that second-hand lanterns can be obtained from dealers in second-hand general merchandise, and many of them are sad affairs, for the dealer, perhaps, knowing nothing about the requirements of a lantern, sells it merely on its own merits. In many cases the purchaser, who may, perhaps, have never before handled a lantern, but, being struck by the price asked, finds upon buying, that he has been sold, and that to put his apparatus in anything like working order, costs him more than he could have purchased a new lantern for, had he in the first instance consulted some one who was conversant with the subject.

We lately had a call from a youth who had been purchasing various parts of the outfit. The body he purchased at Holloway fair, the lens at an auction, the condenser from another source, and the lamp, &c., from other places. He informed us that he had a complete lantern, but as he could not get it to work, asked us to tell him what was wrong. The apparatus having been produced, we saw a tall antiquated tin lantern, with one of the condensers gone, a lamp which was propped up several inches with a piece of wood; a very good-looking c.d.v. lens mount, in the outer end of which was stuck a small magnifying glass, the space between which and the lens mount was occupied by a ring of cork.

Our friend informed us that the lamp leaked a little, but he "could easily mend that." We need not repeat the advice we gave upon the subject, but the whole affair suggested the desirability for giving some simple instructions. which in this series we intend doing. Apart from the look of the lantern body, it matters little of what it is constructed. Its chief use is to confine the rays of light; but although a soap box would perhaps answer the purpose, it is probable that something more ornate will be desired.

In the cheaper form of lanterns the body is made of tin japanned; this, although good of its kind, soon presents a shabby appearance, as the enamel begins to flake off the upper part by the action of the heat.

A good serviceable material for a single lantern is what is known as Russian iron. This is used without being japanned, and retains its good appearance; but perhaps the best material for the body is well-seasoned mahogany with a metal lining, there being a good air space between.

We will take it that in this case the illuminant is to be oil. The lamp commonly adopted for this purpose, is made with either three or four wicks standing lengthways in the lantern. Those lamps containing four wicks are in the form of a W, are a little more expensive than those only having three, and are perhaps a little more difficult to manipulate, but they give a better light.

The wicks are raised or lowered by milled heads at the back of the lantern, the relative heights of each flame being seen through a small hole at the back, which usually contains a piece of coloured glass.

At the front of the lamp will be found a cap, which when unscrewed, reveals the place where the lamp is charged with paraffin oil. Great care should be taken that no oil is spilled, for with an oil lamp, freedom from smell depends upon cleanliness. But once oil is spilled, it is not sufficient to merely wipe it up, it is requisite to remove all traces of greasiness, and too great stress cannot be made about this point.

Some little difficulty may be experienced in getting the wicks level, and the flame free from forks; but once the wicks are right, the scissors should be used as seldom as possible. It will be found best to trim the wicks with a slight arch, and it may or here be mentioned that we gave an illustration of a cutter on page 95 of our last volume, by which the wick can be evenly cut at one operation.

Before purchasing an oil lantern, it is well to see it tried, for we have known cases in which the stop for the lamp had been put in at random, which prevented the light from being placed sufficiently close to the condenser to give a clear disc. Another fact we have found (in wooden body lanterns), is that, in some cases, the front is screwed to the body either too high or too low, so that part of the disc is not illuminated. Of course these defects can be located and readily remedied by one who is conversant with the subject, whilst others who may be ignorant of the cause will be apt to condemn the lantern as bad.

(*To be continued.*)

——:o:——

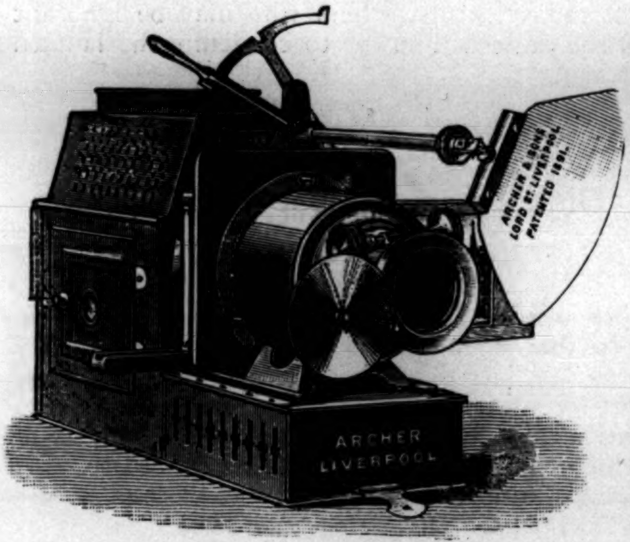
Dissolving Views with Single Lantern.

The word "dissolving" is a somewhat elastic term, but when applied to lanterns it has usually been considered as the gradual melting of one picture into another, and for a brief time during this change both pictures are visible, the light which causes the first picture to be projected being diminished, whilst that of the second picture is increased. Dissolving also means fading or melting away, and if a view projected by the lantern fades into a luminous mist, from which another picture is evolved, this can, of course, be included under the heading of dissolving views.

The effect first spoken of usually requires two lanterns, but by means of a dissolving carrier, which has been introduced by Messrs. Archer and Sons, of Lord-street, Liverpool, we have been able to obtain a pleasing dissolving effect with an ordinary single lantern, provided with an open stage.

The apparatus is termed the "Ideal dissolver for single lanterns," and consists of a double carrier, which is actuated by means of a lever placed on top, the upper part of which is provided with two curved arms of the same radius, but from different centres. Working in connection with this is a second lever, the fulcrum of which is placed about an inch below that of the other. This is provided with a pin, which causes it to engage with the first lever. The second lever terminates in a handle, and it is this from which the movements are actuated. Attached to the fulcrum is an adjustable arm, which is secured to it by a thumb-screw. At the extremity of the arm is a hinged fan, which passes in front of the lens, and cuts off the detail of the picture at the time of the change without cutting off the light itself. We have tried various forms of a cut off, including celluloid, and ground-glass, but that which we considered the best was one in which the glass was sufficiently large to remain in front of the objective. The centre of this shutter was ground, and gradually vignetted into the clear glass portion, so that when passing in front of the lens no line of demarkation was to be seen upon the screen.

The reason for the peculiar form of the upper part of the lever which directly actuates the carrier is to enable the pin of the second lever to disengage itself as soon as the slide is in place, and allow the continuance of its movement to gradually disclose the picture upon the screen.



Gas Bottles and their Safety.*

By F. A. Bridge.

THE use of gas in cylinders has now become so common that the public has ceased to regard it as fraught with any risk, and, considering the immense number of cylinders now filled and emptied every week, the few accidents that have happened certainly justify the confidence hitherto reposed in their safety.

As far as I am aware, no case has occurred of the bursting of a cylinder from over-pressure; they are actually tested to double the strength they are supposed to have to withstand. Stories are told of 15 or even 17 feet of gas having been pressed into a 10ft. bottle; but it has never occurred to me—at least, if it has, the extra has never been charged for—so I am inclined to think it was not there. Full cylinders have been known to fall from an upper window on the stones below, without exploding; heavy weights have been dropped upon them from a great height without doing any further harm than spoiling their outward beauty, which, it must be confessed, is not very great. We may, therefore, say that so far as the cylinders themselves are concerned there is not much to fear, as except accidentally the ordinary user would never expose them to such tests as they are subjected to by those who make or fill them. Only recently, at one of the principal railway stations, a large cylinder was let down suddenly on the nozzle. The result was a waste of eighty feet of oxygen and a general scene among the passengers on the platform. These accidents, however, might have been easily prevented by putting the cylinders in boxes during transit.

What we really have to consider is the bursting of gas regulators and gauges, and our object is to find out, if possible, the cause of these accidents.

First, then, the regulators. There are not many worthy of the name, the best, to my mind, being made by our friend, Mr. Beard. The principal fault with other makes I have seen tried is either that they *don't regulate*, or if they do their action is so erratic as to make them unreliable. As to gauges, the simplest form is known as "Suiter's patent." Here you have no glass, and the worst that can happen is the blowing out the end of the tube, and waste of the gas. The well-known Bourdon gauge is much used, and very useful, because it can be kept attached to the cylinder, and it is easy by its means to see from time to time how the gas is going. I need scarcely say it is not safe to use one of these for oxygen which has been used for any other gas.

Not many days since an exhaustive inquiry was held to ascertain the cause of the bursting of both a gauge and a regulator, and this is really the reason the subject of "Gas Bottles and their Safety" was chosen for our consideration.

I will tell you, as briefly as possible, exactly how it happened.

Wishing to know whether a cylinder was full or empty, I relieved the gauge and regulator from the one just exhausted, and firmly screwed it into the cylinder, the contents of which I was anxious to ascertain. Turning the gas slowly on, the gauge immediately responded. I then turned the gas off again, and calling a friend, I repeated the operation of turning on the gas. The needle of the gauge rapidly registered 120, went past that number, and before I could turn the gas off again, the explosion occurred. I still held on to the cylinder and endeavoured to stop the waste of gas; the valve, however, would not act, and after inhaling more oxygen than was good for me in one dose, I came out of the dark room.

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* Extract from Paper at London and Provincial Photographic Association.

After a few breaths of air, as fresh as I could obtain in a room full of tobacco-smoke, I went back and had another try, but it was of no use. When all the oxygen had escaped, I went into the dark room again, lit the gas, which had been extinguished by the explosion, and looked around. The gauge had snapped short off at the stem and was lying on the floor, the dial was missing, and the glass, of course, blown to atoms, the top of the regulator was embedded in the ceiling, and the cover of the regulator case was missing.

On examining the connections it was found that the cone fitting the interior of the bull-nosed nozzle of the cylinder was partly melted, so was the neck of the cylinder itself; the end of the valve-pin was also melted away. The oxygen had evidently fired in the neck of the cylinder. The end of the Bourdon tube in the gauge, unable to sustain the immense pressure, had burst, bulging the side of the case, forcing out the dial, and as I said before, smashing the glass to atoms. The fire had travelled partly along the tube leading to the gauge, but had not entered the gauge itself. It had travelled mainly in an upward direction, forcing itself up one side of the regulator, it impinged upon the side of the case, burst the indiarubber bellows, blown away the top, partly melted the solder at the top of the cover and scorched the lacquer outside.

We now come to ask the cause of this, and the answer undoubtedly is: Oil in the neck of the cylinder. In the early part of the present year an article appeared in *The Nineteenth Century*, bearing upon this very subject in connection with gas bottles, and describing almost exactly what occurred in the present instance. How came the oil there? that is the question. We have been informed that at one time these kind of pressure gauges were tested with oil, and this may have been one from which it had only imperfectly been removed, but the gauge had been in use quite two years, and, as I said before, there was no trace of fire in the gauge itself. Oxygen compressors tell us they never use oil to lubricate the valves of cylinders, but the portion of the valve-pin when withdrawn from this cylinder was covered with black oil, and the same thing was found in the aperture from which it had been taken. Curiously enough, too, I have taken the pins out of two other cylinders and these are both greasy. The conclusion arrived at a week ago—when this matter was under consideration, was—Oil in the valve; but how it came there there is no evidence to show.

Several men of great ability and experience have been consulted on the subject, including Mr. Adolphe, Mr. Levy, Mr. Newton, Mr. Newton, jun., Mr. T. Ottway, Mr. T. S. Freshwater, Mr. R. R. Beard, Mr. G. R. Baker, Mr. Murray (Brin's Oxygen Co.), and Mr. T. North. As you know, I have had a good deal to do with oxygen in bags, gasholders, and bottles, and have been using the lime-light almost daily for many years. The concensus of opinion is, as I have said before, oil in the valve.

In conclusion, I should like to give you a few words of caution. When turning on or off gas in cylinders always hold them at arm's-length. I invariably take this precaution. The top of the regulator in this instance passed within two or three inches of my head and embedded itself in the ceiling.

To be [at the Lantern] or not to be [at the Lantern]? That is the Question.

By Argus.

This being the time of festivity, I will not write a technical article, but will tell a story, and a true story at that. I have often told it before, so if any of the readers have heard of it they will know who I am; but if they have not, they will remain in ignorance, as I have hidden under the *nom de plume* as stated above.

Not many years ago, I, being a teacher and taking a great interest in Sunday-schools, decided to give the scholars and friends a treat about Christmas-time. The time of year when I made this resolution was June, and being one of the mighty army of users of hand-cameras, and a lanternist as well, I thought the best form for the entertainment to take would be a lantern exhibition, and lecture on "Our Village Life," "our village" meaning the village in which we all lived.

During the summer I was a good customer to plate-makers. I was seldom outside without my hand-camera, and made exposures on all the items of interest that for months occurred in our midst. First, I made a series of negatives of the principal streets, then the surroundings. Snap-shots of two or three congregated together were made at frequent intervals, until I had photographs of all the leading lights in our place—from the newly-married couple leaving the church, to the loafers around the inn, including a fight between two men, the break-down of a furniture waggon, scenes at the fair, &c., in the latter were included two of our staid citizens, mounted upon the wooden horses of a roundabout.

I complimented myself upon my success in obtaining all these negatives without being more than casually noticed. About the end of September I made lantern transparencies from the best of my negatives, and these having been satisfactorily finished, I had them coloured, and when this was completed, set to work to write a story in order to weave into it all the views. After getting it fairly to my mind, I sent the manuscript to a firm in London to get it typewritten so as to be more readable.

In due time it was announced that I would give a lantern show, the Sunday-school pupils were admitted free, whilst their parents and friends paid twopence each; the takings to be devoted to discharging a debt in connection with the church.

As I was giving the treat, I naturally paid all expense of oxygen, &c., &c., myself.

The eventful evening arrived, and the biunial was in position, slides arranged, and a large audience present. I had intended to read the lecture myself; but some one suggested that as I had already done so much, and had so much to do at the lantern, that the lecture be handed to the parson to read.

The introduction was somewhat cool, to the effect that he would read an amusing story, and that I had kindly brought my lantern to show the pictures which would illustrate it.

The whole thing went well—in fact, it was a brilliant success, and towards the end I began mentally concocting my speech, in return for the thanks which I expected for the outlay of many pounds and much time; but imagine my surprise when a vote of thanks was proposed to the parson for "giving us such an enjoyable evening," &c., to which he who had read my lecture replied in what the stereotyped phrase calls "suitable terms," saying, he was pleased to have been of any service; but it was, in the early evening, very doubtful whether he would be able to be present, and so on. It was certainly hinted that it was very kind of me to bring my lantern to the lecture. Imagine my surprise when I found all the credit bestowed elsewhere than in its proper quarter.

As I said at the commencement, I have often told this before, but I have often had a laugh at it since; for, as things leaked out here and there, it was not very long before credit was placed where it was due, and by way of recompence to—I suppose—my feelings and my pocket, I was at a public meeting presented with a handsome watch.

MORAL.

Get some one to preside at the lantern, but be your own spokesman, for in nine cases out of ten it is he who gets the credit of the whole affair.

——:o:——

MR. F. BROWN, of 13, Ossulston-street, N.W., in renewing his advertisement of jets, says: "I have much pleasure in testifying the efficiency of your Journal as an advertising medium. one hundred jets having been sold during the last eight weeks."

— Instructions Wanted. —

BY LANTERN PHOTOGRAPHER.

WHEN *will* manufacturers learn that many technical instruments and appliances are of little use to a purchaser without brief instructions how to use them? And as this instruction cannot always be given personally, short, printed explanations ought to be issued with each appliance. How often this has come under my notice. Now it is a complicated photographic shutter, which one has almost to take to pieces before finding a method of altering the speed; at another time a hand-camera, with almost as many movements as a lever watch, which the unfortunate purchaser has to experiment with at the risk of breaking some lever or pivot.

Let me give a practical instance. Some months ago I bought one of Beard's excellent gas regulators for a cylinder (I had up to the time used gas-bags). It arrived without a word of instruction. I used it at several lectures, lighting the hydrogen at jet first, then opening the oxygen tap at jet, and, lastly, turning on the cylinder valve very gently. I was disappointed; the regulator wouldn't regulate, and, practically, this had to be done at the cylinder valve to prevent hissing at the jet. This went on for some time, and my impression was that the spring in regulator was too strong. But recently I made myself acquainted with the construction of the regulator, through an article upon the subject in these columns. The remedy began to dawn upon me, and a note from Mr. Beard set matters right. The tap at jet *ought to be kept closed* until the cylinder valve is sufficiently opened. Unless this is done, the regulator bellows never expands at all, and the valve in it never acts. Now why should the manufacturer, who knows all about it, compel a purchaser to find out this for himself? A simple label round the neck of his offspring would furnish the requisite information.

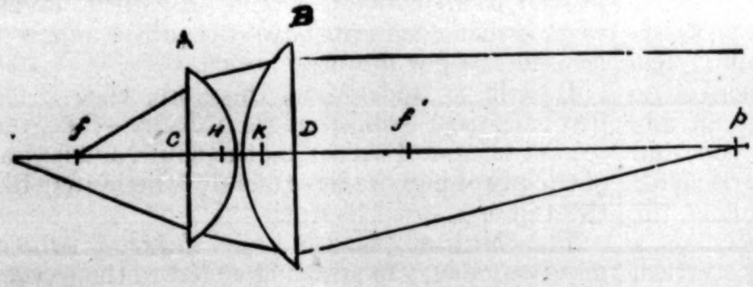
Mine is not a solitary instance, for another lanternist in my own town has quite independently passed through exactly the same experience with a Beard's regulator, and had also returned a regulator of another well-known make (of course sent out without instructions) because he could not make it work under the conditions I named at first.

It will be said that instructions are generally given by the retail dealers. Now, my experience as patentee of an instrument which is sold by dealers generally, tells me that the only way to ensure the user getting instructions is for the manufacturer to issue them *printed* with every instrument. How long will they be so blind to their own interests as to neglect it?

What is the Focus of a Condenser?

In the course of a recent lecture by Mr. E. M. Nelson, he explained that in connection with condensers, there is the equivalent focus and its back focus, as well as the actual focus and its back focus, and unless it is understood which of these four foci is meant, the question cannot be answered; but what is usually meant by the focus is the back focus when the condenser is in use—*i.e.*, the distance of the line to the surface of the condenser. By means of the annexed figure and the use of simple arithmetic, he said, it was a very easy matter for one to find out all about it.

Separate the lenses and find the focus of each by presenting the plane side of the lens to the sun's rays, receiving the image on a card and measuring the distance between the card and the convex surface of the lens.



We will suppose this done and that we find the focus of A to be 5in., and B 6in. Next measure the thickness of the lenses and find that they are each 1in. thick.

It is now necessary to find the equivalent focus which is the principal focus (*i.e.*, the focus to which parallel rays would be brought) of an ideal single lens which is the exact optical equivalent to the two actual lenses under consideration.

First, multiply the foci together, then add them together, then divide the first amount by the second, thus: $6 \times 5 = 30$; $6 + 5 = 11$; 30 divided by $11 = 2\frac{3}{4}$in. (say). The point from which this equivalent focus of $2\frac{3}{4}$in. is to be measured lies within the lens, distance two-thirds of the thickness of the lens from the plane surface, as shown at H and K of sketch. The equivalent focal points f and f^1 can be marked off distant $2\frac{3}{4}$in. from the points H and K, and will be found to be $2\frac{1}{12}$in. from the plane surfaces C and D, and this is the equivalent back focus of the lens. The points H and K are the principal points of the ideal equivalent lens.

We now require to find the focus of the condenser when in actual use. Supposing the objective we are using requires the rays to be brought to a focus at p^1, which may be 8in. from the condenser, what we require to know is, the distance of the line p from the surface C.

First find the distance of the conjugate focus p^1 to the focal point $f.^1$ This will be 8in. less $2\frac{1}{2}$, which we will call 6in. Now multiply the equivalent focus by itself and divide by six, and the dividend will be the distance of the line p from the equivalent focus f. Thus $2\frac{3}{4} \times 2\frac{3}{4} = \frac{121}{16}$ divided by $6 = 1\frac{1}{4}$, therefore the focus is $1\frac{1}{4}$in. from f, or $3\frac{1}{3}$in. from the surface C of the lens, and is the back focus.

The true focal length is the distance p H, which is two-thirds of an inch more than the back focus, or 4in.

We have thus found the various foci: (1) Equivalent focus, $2\frac{3}{4}$in.; (2) back equivalent focus $2\frac{1}{12}$in.; (3) actual focus when in use 4in.; (4) actual back focus $3\frac{1}{3}$in.

In triple condensers the two lenses next the lime have both their plane faces towards the lime, and are arranged to give parallel rays, the third being turned the other way and having a focus to suit the projection lens used. To find the equivalent focus of the first two lenses, we must first ascertain the focus of each lens separately, in the same manner as indicated in the previous example. Supposing the first lens has a focus of 5in., and the second 8in., and the thickness of each lens is 1in.; in order to find the equivalent focus we must multiply the foci together, then add them together and divide the former by the latter, first deducting 1in.; thus, $5 \times 8 = 40$; $5 + 8 - 1 = 12$; 40 divided by $12 = 3\frac{1}{3}$ inches.

The point from which this equivalent focus is measured is inside the first lens at a distance of one-third of its thickness from the plane surface which is next the lime. This gives a back focus of three inches for the position of the lime when the condenser is in use.

—:o:—

THE EIGHTH "ONE-MAN" EXHIBITION.

Will you kindly allow me to state that the eighth of the series of "One-man" Photographic Exhibitions will be open at the Camera Club on and after Tuesday, Jan. 5th.

The pictures will be by Mr. J. Pattison Gibson, of Hexham, by whom we shall be favoured with a representative collection of his photographs.

Visitors will be admitted from ten to four by tickets, which can be obtained from the hon. sec. of the club and from members.

The exhibition will remain open about six weeks.

G. Davison, Hon. Sec. Camera Club.

Safety with Saturators.

By Albert W. Scott.

In the December number of the *Optical Magic Lantern Journal*, there is an article, written by Mr. G. Goodwin Norton, which is likely to give lanternists an erroneous notion of the reliability of ether saturators for general use. He states that he was given a practical demonstration of the working of a saturator by a dealer, and that after a few minutes a "tremendous explosion" occurred, which did no damage. Now, if the rubber tubes between saturator and jet were reasonably short, this explosion could not have been more "tremendous" than the crack of a small pistol without any bullet in it. It seems to have been caused by using a cold saturator in connection with a dissolving tap and unprotected jets, a combination very liable to produce pistol pops, as will be seen shortly.

Mr. Norton makes the statement that this pop "would most assuredly have caused a panic" had it occurred in a public exhibition. There is no record within the writer's knowledge of any actual panic having been caused by a pop; but it is well known that scores of pops have occurred without producing panics. The people near the lantern may move to seats farther away, as a measure of precaution; but they are only startled, not panic-stricken. Many lecturers do not scruple to fire off pistols on the platform as a means of giving additional force to dioramic effects such as the blowing up of steamboats, firing cannons, and the like, and nobody has ever heard of a panic caused thereby.

Pops are, however, very unpleasant interruptions to an exhibition, and the practical question arises—Can they be prevented? To this, the answer is undoubtedly, yes! There are not less than three safeguards at our disposal, any one of which is capable of preventing pops, and if we use two or three of these, the occurrence of pops becomes a practical impossibility, because it is extremely unlikely that two or three safeguards would be out of order at the same time.

The first safeguard is a *sufficient pressure of gas*. No matter how explosive the etherised oxygen may be, so long as it issues from the jet nipple with a moderate degree of force, no pop or explosion can take place. Hence there should be a good pressure of gas turned on at the jet *before* lighting-up, and this pressure must not cease until the light is out, and the lime cold.

To put out the light, we must *not* turn off the gas, but send a current of pure oxygen through the jet instead. Pure oxygen will not burn in air, and therefore the lime cools immediately. When it is cold, we may turn off the gas, but not before.

The reason why a dissolving tap does not suit a saturator, is that it diminishes the gas pressure and breaks down our first safeguard. When the by-pass tap is turned so as to give a small flame in the "top" lantern, we are on the very brink of the "pop" precipice. The merest trifle, such as moving the dissolving handle quickly, will then produce the pop.

The second safeguard is a *protected jet*. The mixing chamber of the jet should be packed with some material which will allow of the passage of gas, but will not permit the passage of flame. Pumice grains may be used for this purpose; but a more handy flame check is cotton wick made damp with glycerine. The writer has used this packing for nearly a year in his own practice and has recently adopted it for rendering customers' jets pop-proof; and, so far, it has proved impregnable to flame. Its great advantage is that a lanternist can if required renew it himself at a few minutes' notice.

It will be understood, therefore, that if the first safeguard—sufficient gas pressure—fails, our second safeguard will arrest the flame, and instead of the pistol pop, we have merely a little snap like the tap of a small hammer.

The third safeguard is a *high degree of saturation;* so much vapour being added to the oxygen in the saturator that it is rendered harmless and non-explosive. This is practically only to be obtained by using ether or gasoline in a *warm* saturator.

If our first safeguard fails, the flame will get inside the nipple; if the second safeguard is not used, the flame will travel through the mixing chamber; but if our third safeguard is in use, there is no gas in a condition to explode, and consequently there is no pop.

The two pops, or "tremendous explosions" which have been described by Mr. Norton during the past year, and which caused him to become disgusted with saturators, can be easily explained. He *might* have used *three* safeguards, but it appears that he only used *one*, the first—viz., gas pressure. When he wanted to put out the light, he *turned off the gas;* he with his own hand destroyed his only safeguard, and as the inevitable consequence, had the pop.

The other pop was caused by an unsuitable jet; the Editor has seen it, and has stated that the bore of the nipple was too large.

It is a pity that there should be so much prejudice and misconception about saturators; there is no doubt that for single lanterns, they give the best possible results, for convenience, brilliancy of light, and safety.

Finally, if a pop does actually occur, what is the risk? None whatever, provided that the operator has his wits about him. If the saturator is properly stuffed with flannel or wool, it cannot possibly burst; and if the operator promptly cuts off the supply of oxygen at the gas bag or cylinder, it cannot possibly be burnt. With a current of oxygen passing through the saturator, if the ether is alight, it will burn fiercely, and may soon melt a hole in the vessel; but the fire goes out instantly when the supply of oxygen is cut off.

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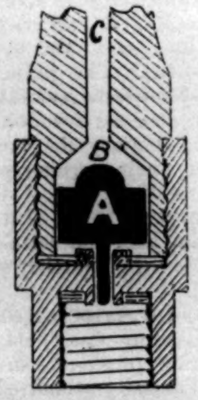
A Safety-Gauge for Compressed Gas.

To obviate all risk of explosion in gauges of the Bourdon type, a patent has been taken out by Messrs. Clarkson and Spurge, for a gauge whereby the compressed gas is not admitted to the interior, but acts on a plunge (A). The Bourdon tube is filled with glycerine, and in order to retain the liquid, a strong chamber (B) is secured to the inlet (C), in which works the valve A. As all the space from the extremity of the Bourdon tube to the upper part of A is filled with the glycerine, no gas can possibly enter, but its force is exerted on the plunger, which in turn communicates it to the fluid.



Supposing the indicating portion of the gauge were to become fractured, only a little fluid would escape, and by so doing the plunger would at once rise to the upper portion of the chamber B, when it would effectively stop all outlet of gas.

Increased safety is further secured by the greatly-reduced energy necessary to actuate the tube under these conditions, which means less rush of gas. Mr. Spurge has demonstrated this by changing an ordinary 4in. Bourdon gauge to one hundred atmospheres, and collecting the gas at atmospheric pressure in a small holder, when it measured thirty-two cubic inches. Treating a similar *but* filled gauge in the same manner, only nine cubic inches were collected. This latter represented the space between the plunger and bottle connection. These experiments showed that the filled gauge required less than one-third of the energy to actuate it.

Flashes on Lantern Topics.

By Bull's-eye.

The dead lantern season has passed, and with the advent of dark nights, work in this direction is beginning to look up. Scotland is and has been especially connected with African Exploration, and one of the latest developments of this took the form of a lecture on Saturday, November 21, in the Hall of Free St Andrew's Church, Edinburgh, by Mr. Fred L. Moir, manager of the South African Lakes Company, of whom we feel rather proud, being a native.

In the course of it, after describing the route on a large map, he gave some interesting details of the journey. Being an accomplished scientist as well as a good photographer, he has made good use of his opportunities, and by means of about one hundred lantern views he endeavoured to bring the scenes before his audience, showing the life and amusements of the passengers on shipboard on the way thither. In the dark continent some views of Quillimane were shown, giving picturesque traits of its common life; others of his party on the route crossing between the Kwakwa and Zambesi rivers, and several of the great falls on the latter; also showing the scenery of the Shire and Ruo rivers with other points on the way, such as Mandalay, Blantyre, and Lake Nyanza, and so onward to Ujiji, on the south shore of Lake Tanganyika. A picture of the dhows in which the party crossed the lake and were nigh wrecked in a frightful storm, but saved only to encounter another human one on shore, where they were all nearly massacred at Katoubka, in the August of 1890. He brought the lecture to a termination shocking to the ladies present, with pictures of the African chief of Ujiji, and his bevy of wives.

Mr. Moir, and his father, the venerable Dr., have been long connected with the church in which his pictures were exhibited.

But Saturdays are not the only days on which the ubiquitous lantern invades the church. On the 22nd of November, it is well to make a note of it, a new departure was taken by a few earnest laymen, who, shocked at the numbers of non-church goers, began what they have called a lantern service, in a disused church in St. Andrew-square, Edinburgh.

The lecturer, Mr. Wm. Brown, S.S.C. (equivalent to the English attorney-at-law) endeavoured to and succeeded in giving a pleasant evening to an overflowing audience, young men especially being invited A capital series of Scriptural subjects were exhibited by Mr. Gulland, and his father, the Bailie, Anglice Alderman, with his friend Bailie Macpherson, and other notabilities were present. The service was interspersed by a number of solos and hymns, and the hour which it occupied was most interestingly spent. So satisfied are the originators that they have determined to continue them. Who will be able to say now that the sour-visaged strict Presbyterian of Scotland is not amenable to something more than kirk-going three times a day?

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A new monthly magazine, "Photographic Review of Reviews," edited by Mr. W. D. Welford, is about to be published by Messrs. Iliffe and Sturmey.

Society Meetings.

Camera Club.—On Monday, 30th Nov., Mr. Frank Haes exhibited his slides illustrating what was done in animal photography in the days of wet collodion. The slides were from negatives made 27 years ago, and the excellence of the representations met with and deserved both surprise and admiration. After Mr. Haes' pictures other slides were shown by Messrs. Davis, Hughes, Bolton, Burchett, Greene, Budger, Walker, Laurie, and Major Becher. On Thursday, Dec. 3, Mr. Dresser read a paper on "Toning rough bromide paper and transparencies;" Mr. Francis Cobb occupied the chair. Mr. Dresser gave different formulæ for mercurial and for uranium toning, referring to a large number of his own examples, which were arranged on the club walls. Mr. Dresser being compelled to leave early, Mr. Herbert Fry kindly gave a demonstration of the toning process, and Mr. Weir Brown added much information and showed some instructive illustrations. On Thursday, Dec. 10, Mr. T. R. Dallmeyer gave a description of his new tele-photographic lens. Mr. Francis Cobb occupied the chair. Mr. Dallmeyer gave a description of the lens. The object is to make possible the production of very large images of distant objects without cumbersome or extensive apparatus. Some remarks were afterwards made by Messrs. Traill Taylor, Elder, Hayman, and by Dr. Fison and Dr. Lindsay Johnson. Dr. A. H. Fison then followed with his subject, "The Application of the Optical Lantern to Scientific Illustration," Mr. H. E. Davis being in the chair. Dr. Fison showed how, by means of the lantern, beautiful and valuable experiments could be made easily visible to a large audience in a way unattainable by other methods. His practical illustrations included some excellent photographs of scientific apparatus, and a series of experiments illustrating the subject of magnetism and electricity.

Cardiff Photo Society.—On the 11th ult., a fine collection of slides, by Mr. A. R. Dresser, were exhibited. These formed a collection entitled "A Tour in Brittany." All the views, which were very fine, were taken by hand-camera.

North Middlesex Photo Society.—The third annual exhibition was held on the 14th ult., at Jubilee House, Hornsey-road. Upwards of 200 pictures were hung, the majority of which were excellent. The awards in Class I. (*Landscapes and Architecture*) were made to Messrs. J. C. S. Mummery, J. McIntosh, F. Cherry, and S. E. Wall; Class II. (*Portraits and Figures*), Messrs. C. Beadle and C. Gill; Class IV. (*Enlargements*), Mr. C. Beadle; Class VI. (*Lantern Slides*), Mr. W. Taylor. There was a large attendance. About 100 lantern slides were projected during the latter part of the evening, these being made by Messrs. Stewart, Walker, Smith, Treadway, Taylor, Beadle, Plunkett, Marchant, Wall, Gill, Ainsley, Gregory, Chang, and Mummery. Out of a total of 66 members, about one-half had pictures on exhibition.

Sheffield Lantern Society.—A largely attended meeting of this society was held on Nov. 2, Dr. Manton in the chair. The president exhibited what he termed a universal lantern, possessing many features of interest suitable either for blow-through jet, ether, or oxy-hydrogen lime-light, and equally adapted for the projection of transparencies or the demonstration of scientific experiments, the front carrying the objective slides on the extending principle of long-focus cameras, the space between the condenser and objective being entirely unenclosed. In practice it was found that there was no appreciable leakage or diffusion of light into the room. Perhaps the greatest novelty lay in the condenser 3¼ by 3¼ inch square, this being of course derived from a slightly larger condenser cut down, and the superfluous arcs of circles removed, the slight loss of light resulting from the increase in focal length being more than compensated for by the power of this small condenser to project on the screen an *unmasked* transparency, *absolutely free from colour*, and clear to the edges. An unusually attractive evening was brought to a close by the demonstration of Scott's oxy-etho-benzine lime-light. A member having expressed a wish for a test, the request was granted. This proved that under the most trying circumstances the light is at least equal to its rivals.

Hackney Photographic Society.—The usual meeting was held on Thursday, 10th Dec., Mr. Jno. Reynolds in the chair. Mr. W. H. Smith gave a very interesting paper and demonstration of a new paper the Platinotype Co. were about to bring out in about six weeks' time. It was three or four times as rapid as the silver paper. The cost would be about three-halfpence for four half plates, and the results would be certain. He demonstrated the printing on this paper by artificial light, using powdered magnesium and oxy-hydrogen light. Giving an exposure of 50 seconds with this light on negative, a fair print was obtained on development.

Herefordshire Photographic Society.—A meeting of the above society was held on Tuesday, Dec. 15, at the Mansion House, Hereford. Mr. T. G. Salwey, of Ludlow, presided. The first business of the evening was the judging of the competition slides, open to the members of the society. The prizes were two exposure meters, given by Mr. Alfred Watkins. Mr. Smith (Eastman Co.) acted as judge, and awarded the two meters to Mr. G. Parker, hon. sec.; and Mr. E. G. Davies, assistant hon. sec. Mr. C. H. Woodhouse was also highly commended. The judge remarked that the series of competition slides were remarkably good. Mr. Smith then commenced his demonstration on the working of the Kodak hand-camera, showing the various sizes of cameras made, and explaining their working parts very explicitly. He then put upwards of a hundred slides through the lantern of snap shots, comprising views of street scenes in particular, seaside and parade bits, and vessels of all kinds, and some very interesting slides of the poultry yard and animal life.

Liverpool Amateur Photographic Association.—The annual meeting of the 28th Session was held on Nov. 26, Mr. Paul Lange, the retiring president, in the chair. The hon. sec. (Mr. E. M. Tunstall) submitted an exhaustive report of the society's proceedings during the year, which stated that there was now a membership of 303. Mr. P. H. Phillips, the hon. treasurer, presented the balance-sheet, which showed that the total receipts for the year were £178 1s. 10d., against an expenditure of £173 19s. 2d. The election of officers for the ensuing year was then proceeded with. President, Mr. W. Tomkinson; vice-presidents, Mr. James Earp and Mr. A. Tyrer; hon. librarian, Mr. I. Woolfall; hon. treasurer, Mr. P. H. Phillips; and hon. secretary, Mr. F. B. Illingworth; and the following to fill the vacancies created by retiring members of the council—viz., Messrs. Paul Lange, H. B. Millar, F. H. Glazebrook, Dr. Kenyon, and F. Angon. The result of the prize competition, which it was stated compared very favourably with previous years in point of number of exhibits and artistic excellence, was afterwards announced, and an exhibition of lantern slides sent in for competition to the number of 132 followed.

Ipswich Scientific Society.—On Tuesday evening, December 1, a large company assembled at the Old Museum Rooms, for the purpose of hearing a lecture by the Rev. E. Ledger, of Barham, on "The Shooting Stars, Meteorites, and Comets." He gave some introductory remarks relative to the wondrous way in which the science of astronomy linked together the finite and the infinite, and to the extraordinary connection which had been established between the discoveries of the telescope and the microscope in the efforts of science to obtain some knowledge of the great universe. Neither the planets nor their satellites, the minor planets nor the periodic comets, were perhaps the most important members of the region surrounding the sun. In addition to these, there were countless myriads of meteorites, or fragments of solid matter of varying size. Numbers had fallen upon the earth, and big pieces of them had been picked up in fragments of rock or metallic stone. The greater part of such shooting stars as became visible, however, and millions of smaller ones that were invisible, were dissipated in gas and dust upon coming into contact with the atmosphere of the earth. One shooting star could be seen about every five minutes with the naked eye, but the telescope showed that the actual number would probably be 20 times as large, and this raised the total to four hundred millions of meteorites that were encountered by the earth every 24 hours. The lecturer gave a description of the manner in which the theory formed by astronomers had been confirmed by at least one actual occurrence, which may be summarised shortly in the statement that, after a comet had disappeared, it was predicted by a clever German that on or near a certain night there would be a grand display of meteors which had taken the place of the comet, and were moving in its old orbit; and that prophecy was fulfilled to the letter. A series of splendid stellar photographs recently taken were shown on the screen by Mr. Vick.

Sheffield Society of Engineers.—On the 5th ult. a meeting of the members of this society was held to hear a paper upon "Our Iron Roads," by Mr. George Blake Walker, C.E. Professor Ripper presided. Commencing with the early history of railways, the lecturer traced their development, explained the process of obtaining a level track, laying the permanent way, the disposition of stations and sidings and signalling, the various types of rolling stock for goods and passenger traffic. The lecture was illustrated by a series of photo-lantern slides, taken from the objects.

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Editorial Table.

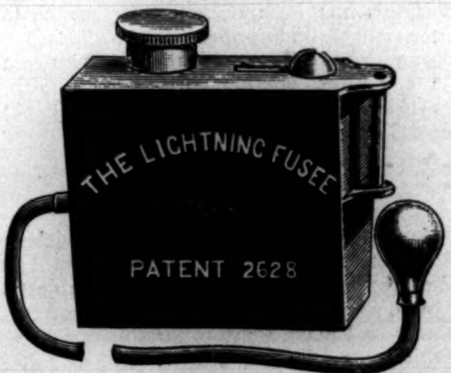
Catalogues.—The catalogue of Messrs. Noakes and Son, of Nelson-street, Greenwich, contains much that is of interest, besides prices of every conceivable style of lantern apparatus. About a dozen pages of practical hints are given, the outcome of the experience of the partners (Messrs. D. W. Noakes and C. W. Lock), who correctly describe themselves as practical men. Among the various pages we find an application to the "Intermedial Regulator" for gas cylinders. This we know from experience is a capital adjunct when a single lantern is used. The whole gas pressure can be turned on this valve, which can then be turned on as desired by merely rolling one finger on the milled head; certainly a vast improvement on struggling with the usual bottle key when endeavouring to regulate the outlet of gas.

A handsome cloth-bound and gilt-lettered catalogue has reached us from Mr. J. H. Steward, 406, Strand. It consists of about 260 pages, and contains descriptions of oil, lime-light, and electric lanterns. In the body of the catalogue are instructions in the use of pressure gauges, it being recommended not to make the connection to gas cylinder quite tight until the valve has been turned on a little. The second part of the book is devoted to lists and particulars of slides. A convenient gas bottle label is used by this firm, and is contained in a small leather case, with strap and buckle; the address is written on one side of the card, and in the corner appears the letters "P. T. O.," whilst the other side contains particulars—viz.,

Cylinder No.................. Tested.......................
Date when filled .... Contents (cubic feet)......
Used (date) ....hours.
Weight, empty ...lb. ...oz. Full ...lb. ...oz.

The catalogue of slides supplied by the United Kingdom Band of Hope Union, Ludgate Hill, E.C., is a colossal affair (over 400 pages). It is divided in sections from A to J, and has a very complete index, and opposite each heading is found the number of slides, section, and page. It is very questionable whether there are any slides published that are not catalogued in these pages.

Slide Binder Moistener.—Mr. W. Tylar, of Birmingham, has introduced a neat little instrument as an aid to those who mount lantern transparencies. It consists of an ornamental glass bottle, in which is inserted an ingeniously shaped metal top, which is covered with a flannel cushion, and communicates with a piece of felt placed inside. Water is poured into the bottle; this by capillary attraction keeps the cushion damp. Gummed binding strips, when drawn across the cushion, are thus sufficiently moistened for adhering to the slide.



Flash Lamp.—A small flash lamp, called the "Lightning Fusee," has been received from Messrs. J. F. Shew and Co., of Newman-street, W. The lamp is so small that it occupies no more space than a box of wax vestas. It will be found particularly convenient, and gives as good a light as desirable, either as a flash or continuous. As it does not burn spirit it can be ready for use at a moment's notice, it being merely necessary to insert a lighted fusee in the socket for the purpose, and squeeze the ball. The annexed cut shows the lamp full size. There is also an arrangement for a continuous light.

"Photographic Times" Almanac.—This American annual, which is published at 2/- in London by Hampton, Judd and Co., 17, Farringdon-street, E.C., contains a number of instructive articles and twenty-four fine illustrations. As only a limited number has been sent to this country, we advise our readers to secure a copy ere it is too late.

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Correspondence.

LANTERN MICROSCOPE.

[*To the Editor.*]

Sir,—Your correspondent (Mr. J. H. Furnivel) first of all pays me a compliment, for which I am obliged. Then he pays himself one, and he gets "mixed," for I never recommended or advocated in any way higher powers for the lantern microscope than the $\frac{1}{10}$in., and maintains that this is a "high power" for a lantern microscope. Mr. Furnivel says "I have come round to his views by not recommending the use of special objectives." Here again he is mistaken. The next paragraph in his letter is a complete distortion of anything I have ever said, and not worth replying to. Later he tells us that he used the sub-stage condensers, and the objective adapters sixteen years ago, and for anything I know he might have used them before I was born, but *now* I am able to show him how to use them to the best advantage. Mr. Furnivel says he does not use an alum trough. Well, I too have discarded alum in favour of plain water, which is found to answer the purpose quite as well.

Mr. Furnivel concludes by stating that he has never melted a slide, and I see no reason why he should, *from the way he exhibits them.*—Yours, &c., W. I. CHADWICK.

Manchester.

ILKESTON EXPLOSION.

[*To the Editor.*]

SIR,—In reading the evidence of the Ilkeston explosion, I have no doubt that the gases were mixed in one, if not in both bags. They were *both* black bags, one being marked with an "O."; and probably in *filling up* the bags, with the gas left in them from the previous night's exhibition, the fatal mistake was made.

In my practice we use a black bag for oxygen, and a drab one for hydrogen. The stop-cocks, moreover, are of *different shapes*; so that even in the dark a mistake cannot be made.

I should have considered an "ordinary precaution" would be to try the light, and consequently the quality of the gases, and centre the lantern *before* the audience entered the building; and if this had been done, no one but the unfortunate Mr. Scattergood would have been injured. This we invariably do; and all exhibitors of the oxy-hydrogen light in public, in any form, whether with bags or bottles, should make this their rule.—Yours very truly, B. J. MALDEN.

14, Great Coram-street, London, W.C.

OPAQUE SCREEN.

[*To the Editor.*]

SIR,—Many have read the interesting articles that have appeared of late on "Opaque Screens," and I and many others thank you for drawing attention to a subject so important to a more successful use of the optical lantern, and venture to send how I made a cheap portable opaque sheet for a room requiring a disc of 9ft. × 9ft., at a distance of 40ft., which would not allow in any way the fixing of my usual opaque sheets. To avoid hiring a calico sheet so inferior in results, I took three lengths of linen, a yard wide, sewed these edge to edge; then papered with white paper, strained and whitened same with mineral white, and tacked this sheet on a roller, 10ft. × 2in., with a lath at the bottom, thus producing a portable screen, 9ft. × 9ft., of snow-whiteness, opaque, and on a roller, at a cost of 8s. 9d.—viz., linen, 2s. 3d.; wood, 2s. 6d.; colouring, &c., 4s.

I would further add my testimony of the great advantage of the opaque sheet to conserve the rays of light under circumstances that are a good test to its advantages.

I publicly exhibited some 300 photographs, coloured slides, and effects, &c., close to the brilliant illuminations of the Worcester Guildhall and Market, showing a disc 14ft. × 14ft. from the opposite side of the street, and against other illuminations of the adjoining tradesmen, being able to show effectively on to an opaque sheet what would have been but a poor failure if projected on to the usual transparent sheet.—Yours, &c,, W. D. SLADE.

12, Promenade Villas, Cheltenham.

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Notes and Queries.

W. E. Stride.—Your suggestion will be treated in the series of articles which we commence in this issue.

F. W. Lewis and others.—Thanks for cuttings *re* explosion.

W. D. Slade.—(1) If you cannot make the leather washers perhaps Mr. Beard will supply you. (2) The easiest plan to project on the screen hung across the road in the manner you suggest would be to hang the muslin in a slanting direction, and have the lantern at the upper window several doors off; in this way it will be about parallel with lantern, and the image can be seen by people on either side.

M.—We cannot undertake to supply you with a list and description of slides suitable for your entertainment. We deal neither in lanterns nor slides. Better consult some of the firms whose advertisements you will find in this issue.

Safety writes: "The subject of lantern explosions is one which has recently been forcibly brought to our notice, and the excuse of inexperience on the part of the operator does not aid us to any extent, seeing that such can and has occurred to a lanternist with an experience of nearly a quarter of a century. The element of danger consists in the admixture of gases, and this mainly when the mixed jet is used in conjunction with gas-bags. Why not then, it may be asked, abolish gas bags altogether, and employ nothing but cylinders?" *Reply.*—You abstain from giving your name, but from the postmark on your letter we have a faint suspicion that your commercial interests lie in the compressed gas line.

Economy.—Both Messrs. Wilkinson and Co., and Mr. F. J. Stedman do excellent slide colouring, and we cannot answer your question as to which will give you greatest satisfaction. Why not send a few slides to each, and you can then judge for yourself?

E. R. Rutherford asks: "(1) Is there any danger in pouring a little oil into the nose of an oxygen cylinder? I thought that perhaps by so doing some of the oil might reach the thread of the screw, which is exceedingly stiff, and is most difficult of adjustment. I use one lantern only. (2) Can you recommend any apparatus which is cheap that I can screw on the bottle to allow the gas to pass without having to dodge about with a piano key?" *Answer.*—(1) Read the paper in this issue by Mr. F. A. Bridge; that will give you an idea of the danger of oil in the valve. (2) We have tried a simple form of screw regulator (when using a single lantern) made by Noakes and Son, of Greenwich, and are well pleased with its action. If you get one you will be able to regulate the gas with a degree of ease and nicety which will surprise you. The cost is nine or ten shillings.

S. Elder.—There is no *particular* way about washing a cotton screen. It can be done by anyone versed in the art of washing clothes.

Disc.—The cause of the indistinctness at top is probably owing to the screen not standing parallel with the lantern. If the lantern is tipped up, incline the screen forward a little.

Ch. A. Perry.—It has been suggested that the addition of a little napthaline to paraffin oil will improve the brilliancy of the light. You might try it.

Jas. Baker writes: "I lately bought an oil lantern, but find that there is always a shadow at the top of the disc; how can I make this right?" *Reply.*—The best thing to do is to return it to the firm from whom it was purchased. Had you told us whether it was wood or tin we might have been able to tell you how to remedy the defect. Either the lamp is not the correct height, or the front has not been put on in the proper position.

Spirit Jet.—We cannot say whether the new jet you speak of possesses advantages over others in use or not. We have read particulars of it, and it appears good, but cannot speak definitely, not having seen the article itself.

F. J. B. writes: "I have a four-wick patent lamp added to my lime-light lantern. After lighting for a little while all goes well, when gradually the two right-hand lights get lower and dimmer, until there is no light worth speaking of. If you turn the wicks higher no better light can be got. What is the remedy?" *Answer.*—Perhaps the two wicks only just touch the oil when the lamp is full. When the oil supply is partly consumed the short wicks will take up no oil.

Prof. Barr.—Thanks. In our next.